

## Features

- ◆ Ultra wide 4:1 input voltage
- ◆ I/O isolation 5000 VACrms rated for 250 VACrms working voltage
- ◆ 2 x MOPP Medical safety according to AAMI/ANSI ES 60601-1:2005(R) and IEC/EN 60601-1 3rd edition
- ◆ Low leakage current <2  $\mu$ A
- ◆ Very high efficiency up to 89%
- ◆ Extended operating temperature range -40°C to 85°C.
- ◆ Input filter to meet EN55022 class A
- ◆ 3-year product warranty



The THM-10WI series is a range of high performance, regulated 10 Watt DC/DC converters in a DIP-24 plastic package. The reinforced I/O-isolation system complies with the medical safety requirements for MOPP (Means Of Patient Protection). Together with a wide 4:1 input voltage range, and an internal EMI filter to meet EN55022 class A the converters constitute also a reliable solution for many demanding applications such as transportation systems, industrial control equipments, measurement equipments, and some IGBT driver applications. With A high efficiency of up to 87% and highest grade components the converters can reliably operate in an ambient temperature range of -40 up to +85°C.

## Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
THM 10-0510WI	4.5 – 9 VDC (5 VDC nominal)	3.3 VDC	2500 mA	80.0 %
THM 10-0511WI		5.0 VDC	2000 mA	84.0 %
THM 10-0512WI		12 VDC	830 mA	86.5 %
THM 10-0513WI		15 VDC	670 mA	87.0 %
THM 10-0515WI		24 VDC	416 mA	85.5 %
THM 10-0521WI		$\pm$ 5.0 VDC	$\pm$ 1000 mA	83.0 %
THM 10-0522WI		$\pm$ 12 VDC	$\pm$ 416 mA	85.5 %
THM 10-0523WI		$\pm$ 15 VDC	$\pm$ 333 mA	86.5 %
THM 10-2410WI	9 – 36 VDC (12 VDC nominal)	3.3 VDC	2500 mA	83.0 %
THM 10-2411WI		5.0 VDC	2000 mA	86.5 %
THM 10-2412WI		12 VDC	830 mA	89.0 %
THM 10-2413WI		15 VDC	670 mA	89.0 %
THM 10-2415WI		24 VDC	416 mA	89.0 %
THM 10-2421WI		$\pm$ 5.0 VDC	$\pm$ 1000 mA	85.0 %
THM 10-2422WI		$\pm$ 12 VDC	$\pm$ 416 mA	89.0 %
THM 10-2423WI		$\pm$ 15 VDC	$\pm$ 333 mA	88.0 %
THM 10-4810WI	18 – 75 VDC (48 VDC nominal)	3.3 VDC	2500 mA	82.5 %
THM 10-4811WI		5.0 VDC	2000 mA	86.5 %
THM 10-4812WI		12 VDC	830 mA	89.0 %
THM 10-4813WI		15 VDC	670 mA	89.0 %
THM 10-4815WI		24 VDC	416 mA	88.5 %
THM 10-4821WI		$\pm$ 5.0 VDC	$\pm$ 1000 mA	85.0 %
THM 10-4822WI		$\pm$ 12 VDC	$\pm$ 416 mA	88.0 %
THM 10-4823WI		$\pm$ 15 VDC	$\pm$ 333 mA	88.0 %

### Input Specifications

Input current at no load	5 Vin models: 20 mA typ. 24 Vin models: 6 mA typ. 48 Vin models: 4 mA typ.
Start-up voltage / under voltage shut down	5 Vin models: 4.5 VDC / 4.0 VDC typ. 24 Vin models: 9.0 VDC / 8.0 VDC typ. 48 Vin models: 18 VDC / 16 VDC typ.
Surge voltage (1 sec. max.)	5 Vin models: 16 VDC max. 24 Vin models: 50 VDC max. 48 Vin models: 100 VDC max.
Conducted noise	EN 55022 class A, without external components
ESD (electrostatic discharge)	EN 61000-4-2, air $\pm 8$ kV, contact $\pm 6$ kV, perf. criteria A
Radiated immunity	EN 61000-4-3, 10 V/m, perf. criteria A
Fast transient / surge (with external input capacitor / diode)	EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 2$ kV perf. criteria A
– external input capacitor:	5 Vin models: Nippon chemi-con KY 1000 $\mu$ F/ 25 V and reverse diode (Vishay V10P45) in parallel 24 Vin models: Nippon chemi-con KY 470 $\mu$ F/ 50 V 48 Vin models: Nippon chemi-con KY 330 $\mu$ F/ 100 V
Conducted immunity	EN 61000-4-6, 10 V, perf. criteria A
External input fuse required (recommended values, slow blow type)	5 Vin models: 10 A 24 Vin models: 5 A 48 Vin models: 2.5 A

### Output Specifications

Voltage set accuracy	$\pm 1.0$ % max.
Regulation	– Input variation – Load variation 0 – 100 %:
	single output models: 0.2 % max. dual output models: 0.5 % max. single output models: 0.2 % max.. dual output models balanced load: 1.0 % max. dual output models unbalanced load: 5.0 % max.
Minimum load	not required
Start up time	30 mS
Ripple and noise (20 MHz Bandwidth)	3.3 & 5.0 VDC models: 30 mVp-p typ. with cap. 10 $\mu$ F/25V X7R MLCC 12 & 15 VDC models: 40 mVp-p typ. with cap. 10 $\mu$ F/25V X7R MLCC 24 VDC models: 50 mVp-p typ. with cap. 4.7 $\mu$ F/50V X7R MLCC
Transient response (25% load step change)	250 $\mu$ s typ.
Current limitation	150 % Iout nominal typ. (hiccup mode)
Short circuit protection	continuous (automatic recovery)
Over voltage protection	3.3 VDC output models: 3.7 – 5.4 VDC 5 VDC output models: 5.6 – 7.0 VDC 12 VDC output models: 13.5 – 19.6 VDC 15 VDC output models: 18.3 – 22.0 VDC 24 VDC output models: 29.1 – 32.5 VDC
Capacitive load	3.3 VDC output models: 3000 $\mu$ F max. 5 VDC output models: 2500 $\mu$ F max. 12 VDC output models: 430 $\mu$ F max. 15 VDC output models: 350 $\mu$ F max. 24 VDC output models: 125 $\mu$ F max. $\pm 5$ VDC output models: 1440 $\mu$ F max. (each output) $\pm 12$ VDC output models: 250 $\mu$ F max. (each output) $\pm 15$ VDC output models: 180 $\mu$ F max. (each output)

All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

### General Specifications

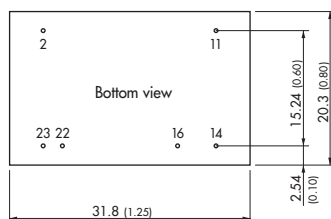
Temperature ranges	<ul style="list-style-type: none"> <li>- Operating</li> <li>- Casing</li> <li>- Storage</li> </ul>	-40°C to +85°C (with derating) +105°C max. -55°C to +125°C
Derating		3.6 %/K above +77°C
Humidity (non condensing)		95 % rel H max.
Temperature coefficient		±0.02 %/K typ.
Switching frequency		300 kHz ±30 kHz. (puls width modulation)
I/O isolation voltage (50Hz, 60sec.)	- to meet ES/IEC/EN 60601-1	5000 VACrms, rated for 250 VACrms working voltage, 2 x MOPP
Clearance/creepage		8 mm min.
Leakage current		2 µA max. (at 240 VAC, 60 Hz)
Isolation capacitance	- Input/Output	17 pF max. (at 100 KHz, 1 V)
Safety standards		ANSI/AAMI ES 60601-1:2005/(R)2012, IEC/EN 60601-1 3rd edition
Safety approvals	- UL online certification ES 60601-1	<a href="http://www.ul.com">www.ul.com</a> File e188913, copy: e188913qqhm2.pdf
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>3.8 Mio h
Casing material		non conductive plastic (UL 94V-0-rated)
Potting material		silicone (UL 94V-0-rated)
Vibration and thermal shock resistance		according to MIL-STD-810F
Weight		14.0 g (0.48 oz)
Soldering temperature		max. 265°C / 10 sec.
Environmental compliance	<ul style="list-style-type: none"> <li>- Reach</li> <li>- RoHS</li> </ul>	<a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf</a> according RoHS directive 2011/65/EU



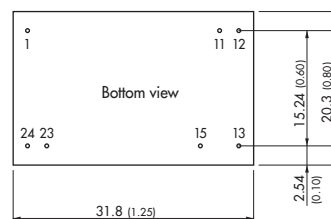
- The component is not be used in an oxygen rich environment.
- The component is not to be used in conjunction with flammable anaesthetics and agents.
- The component has to be disposed appropriately. Please refer to local regulations (Waste Electrical and Electronic Equipment).
- A modification of the component is not allowed.

### Outline Dimensions

Standard pinning



Optional pinning: suffix -A1

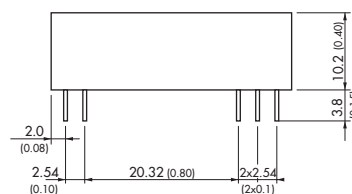
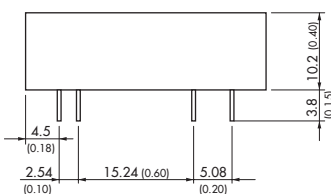


#### Standard Pinout

Pin	Single	Dual
2	-Vin (GND)	-Vin (GND)
11	No con.	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)

#### Optional Pinout

Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
11	No pin	Common
12	-Vout	No pin
13	+Vout	-Vout
15	No pin	+Vout
23	-Vin (GND)	-Vin (GND)
24	-Vin (GND)	-Vin (GND)



Dimensions in [mm], ( ) = Inch  
Pin  $\varnothing$  0.6 ±0.1 (0.024 ±0.004)

Tolerances ±0.5 (±0.02)  
Pin pitch tolerances ±0.25 (±0.01)

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)